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Improving thermal, electrical and mechanical properties of fluoroelastomer/amino-functionalized multi-walled carbon nanotube composites by constructing dual crosslinking networks

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ABSTRACT: Carboxylic functionalized multi-walled carbon nanotubes (MWCNTs-COOH) were modified by using ethylenediamine (EDA) to prepare amino-functionalized multi-walled carbon nanotubes (MWCNTs-A). MWCNTs-A were characterized by Fourier transform infrared spectroscopy (FT-IR), Raman spectroscopy, X-ray photoelectron spectroscopy (XPS) and transmission electron microscopy (TEM). Fluoroelastomer (FKM) was reinforced by incorporation of MWCNTs-COOH and MWCNTs-A, respectively. The thermal, electrical and mechanical properties of the FKM/MWCNT composites were studied. The results indicated that a more homogeneous dispersion of nanotubes and a stronger interfacial interaction in FKM/MWCNTs-A composites were achieved than in FKM/MWCNTs-COOH ones. As a result, the thermal, electrical and mechanical properties of the FKM/MWCNTs-A composites were higher than that of the FKM/MWCNTs-COOH composites due to the participation of MWCNTs-A in the crosslinking process to form dual crosslinking networks in the FKM matrix.

Keywords: Multi-walled carbon nanotubes; Amino functionalization; Fluoroelastomer; Interfacial interaction; Crosslinking mechanism

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